

NITFS HISTORY

Bandwidth Compression Symposium

Arnold, MO

15 May 2002

Topics

- **NITFS HISTORY**
- **NITFS OBJECTIVES**
- **NITFS OPERATIONAL CONCEPT**
- **NITFS EVOLUTION STRATEGY**
- **NITFS SUITE OF STANDARDS**
- **NITFS IMPLEMENTATION HISTORY**
- **NITFS COMPRESSION OPTIONS**

NITFS HISTORY

- 1989 - NITF 1.1 published and disseminated for general use (March)
- 1990 - NITF Certification Test Facility (CTE) established
- 1991 - NITF began conversion to Department of Defense Standards, name changes to NITFS
- 1993 - Completed development and validation of NITF 2.0
- 1994 - Certification testing of NITF 2.0 systems & software
- 1995 - Began development of: MIL-STD-2500B NITF 2.1, ISO 12087-5 BIIF, and STANAG 4545 NSIF 1.0
- 1998 - ISO 12087-5 BIIF approved as an international standard (Feb.)
 - NITF 2.1 (2500B) certification testing begins (Oct.)
 - STANAG 4545 NSIF ratified (Dec.)
- 2000 - ISO/IEC 15444 JPEG 2000 Part 1
- 2002 - ISO Profile of BIIF for NSIF/NITF

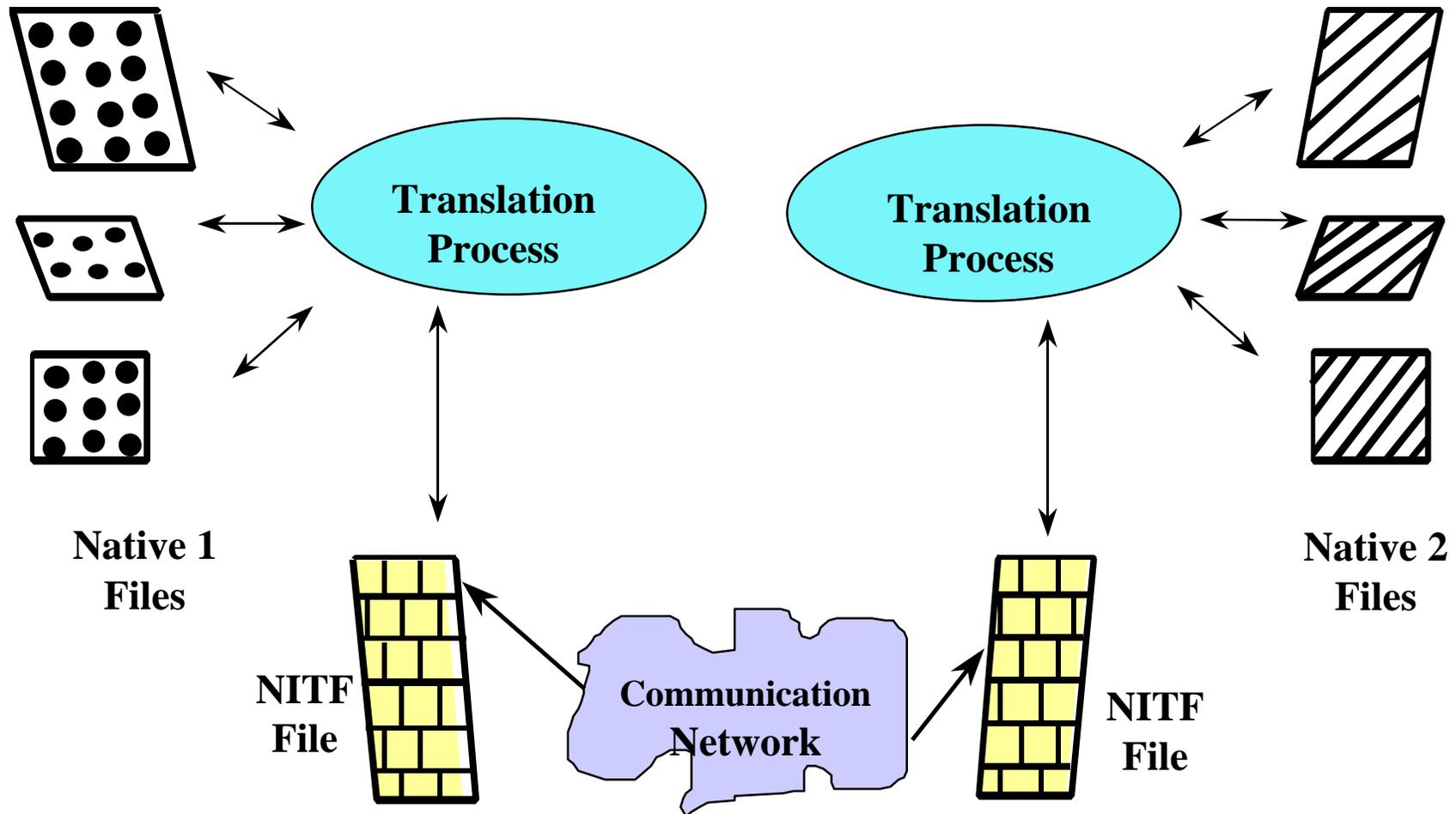
NITFS OBJECTIVES

- **To provide a means for diverse systems to share imagery & associated data.**
- **To enable systems to exchange comprehensive information in a single file to users with diverse needs & capabilities.**
- **To enable users to select only data items that correspond with their needs & capabilities.**
- **To minimize the cost & schedule required to achieve the capability to share imagery & associated data.**

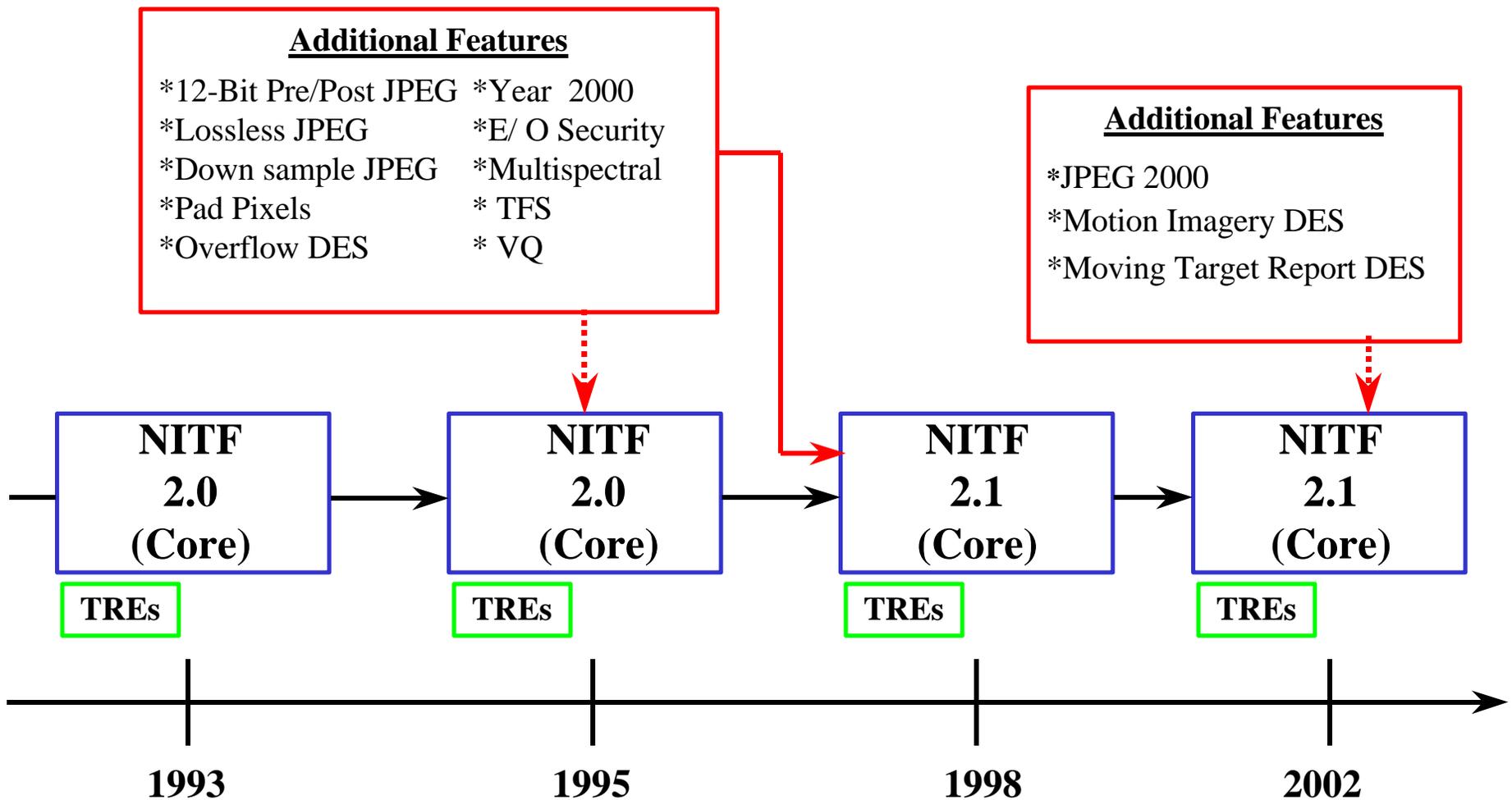
NITFS OPERATIONAL CONCEPT

- **Data interchange between systems is potentially enabled by a cross-translation process.**
- **Systems only need to comply with one (vice many) external formats.**
- **Systems will have the capability to translate internal representation for data to and from the NITF file format.**
- **Systems will have the capability to exchange with one or more recipients using: Tactical Communication Protocol (TACO2), TCP/ IP, LAN/WAN, Command WANs, and/or Media (e.g., tape, CD, etc.).**

NATIVE MODE TO NITF



NITFS EVOLUTION STRATEGY



NITF 2.0 CORE SUITE OF STANDARDS

- **MIL-STD-2500A** National Imagery Transmission Format (NITF) (Version 2.0) for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-2301** Computer Graphics Metafile for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-188-196** Bi-Level Image Compression for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-188-197A** Adaptive Recursive Interpolative Differential Pulse Code Modulation (ARIDPCM) Image Compression for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-188-198A** Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-188-199** Vector Quantization Decompression for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-2045-44500** Tactical Communications Protocol 2 (TACO2) for the National Imagery Transmission Format Standard (NITFS).

NITF 2.1 CORE SUITE OF STANDARDS

- **MIL-STD-2500B** National Imagery Transmission Format (NITF) (Version 2.1) for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-2301A** Computer Graphics Metafile for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-188-196** Bi-Level Image Compression for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-188-198A** Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-188-199** Vector Quantization Decompression for the National Imagery Transmission Format Standard (NITFS).
- **MIL-STD-2045-44500** Tactical Communications Protocol 2 (TACO2) for the National Imagery Transmission Format Standard (NITFS).

Documents available at: <http://164.214.2.51/ntb/>

ADDITIONAL NITFS KEY DOCUMENTS

- **N-0105/98** - National Imagery Transmission Format Standard (NITFS) Standards Compliance and Interoperability Test and Evaluation Program Plan Version 1.0
- **N-0106/98** - National Imagery Transmission Format Standard (NITFS) Bandwidth Compression Standards and Guidelines
- **STDI-0002** - The Compendium of Controlled Extensions (CE) for the NITFS
- **ISO/IEC 12087-5** Basic Image Interchange Format (BIIF)
- **ISO BIIF Profile** - NATO Secondary Imagery Format (NSIF) Version 1.0
- **ISO/IEC 15444 Part 1** - JPEG 2000
- **ISO/IEC 15444 Part 4** - JPEG 2000 Compliance Testing
- **JPEG 2000 Profile** - Implementing JPEG 2000 in BIIF (NITF/NSIF)

<http://164.214.2.51/ntb/>

NITFS TEST PROGRAM

- **Test Director**
 - **Mr. Stephen Kerr**
- **Sponsor**
 - **National Imagery and Mapping Agency (NIMA)**
- **Objectives**
 - **Executive Agent for NIMA Imagery-related Testing**
 - **Standards Validation Testing**
 - **Standards Conformance Testing**
 - **Standards Based Interoperability Testing**
- **Clients:**
 - **DoD & Federal Agencies**
 - **NATO**
 - **Commercial Vendors**

Testing Statistics

NITF Version 2.0

(1994-Present)

222 System Configuration Tests

51 Separately Named Products

32 Developers

NITF Version 2.1

(1998-Present)

83 System Configuration Tests

20 Separately Named Products

15 Developers

Vendor Participation

BTG	GE Aerospace	Orbital Imaging Corp
TRW	Harris Corp.	Lockheed Martin Corp.
BAE	GTE (DIEPS)	Technology Services Corp.
ITAC	E-Systems	Paragon Imaging, Inc.
SAIC	Space Imaging	Northrop Grumman
TASC	VITec Imaging	Eastman Kodak Corp.
ITEK	ERDAS, Inc.	Loral Federal Systems
Hughes	Phototelesis	Texas Instruments, Inc.
SEMCOR	Geodynamics	Rome Laboratory
Raytheon	GDE Systems Inc.	Sterling Software, Inc.
EarthWatch	General Dynamics (GTE Government Sys)	
Motorola Sys	Solutions Group	Marconi Integrated Sys Inc.

Agencies/PM's Sponsoring Tests

DISA

SAF/AQ

NIMA

DIA

SOCOM

FORSCOM

JFCOM

ONI

USASPO

NAWC

OASD

OSO

SPAWARS

JMCIS PMO

AFMIS PMO

CIP PMO

DAGS PMO

MATRIX PMO

IPA/IPL PMO

IDEX PMO

JDISS PMO

JSIPS PMO

Joint STARS PMO

PPPS PMO

NISE-East

Radiant Mercury PMO

NITFS COMPRESSION OPTIONS

- **ARIDPCM**
- **BI-LEVEL**
- **JPEG**
- **Vector Quantization (VQ)**
- **JPEG 2000**

ARIDPCM

- **Adaptive Recursive Interpolative Differential Pulse Code Modulation (ARIDPCM)**
- **MIL-STD-188-197A**
 - **Used only in NITF Version 1.1**
 - **Single band, 8 bits per pixel, grayscale imagery**
 - **Image sizes up to 512 x 512 pixels**
 - **Suitable for 286 or higher processor**
 - **Used while awaiting completion of ISO/JPEG**

BI-LEVEL

- **MIL-STD-188-196**
- **ITU-T RECMN T.4 AMD2**
 - **Standard for Group III Facsimile**
 - **Single band, 1 bit per pixel (Bi-Tonal)**
 - **Black and White or with 2-color LUT**
 - **Image sizes up to 2560 samples x 8192 lines**
 - **Suitable for 286 or higher processor**
 - **Images of document pages or hand drawn sketches**

JPEG

- **MIL-STD-188-198A, N-0106/98**
- **ISO/IEC 10918-1**
 - **DCT Lossy**
 - **8-Bit per pixel precision**
 - **12-Bit per pixel precision**
 - **Lossless**
 - **Downsample JPEG (NIMA Method 4)**
 - **Grayscale and Color Imagery**
 - **Images up to 8K x 8K when unblocked**
 - **Images up to 64K x 64K when blocked**
 - **Suitable for 386 or higher processor**

JPEG continued

- **Standardized Quantization Tables for:**
 - **General Purpose Grayscale**
 - **General Purpose Color**
 - **Visual/EO**
 - **Infrared**
 - **Detected SAR**
 - **NIMA Method 4 Grayscale**
- **Five levels of quality for each image type**
- **Provisions for ‘Custom’ Tables when needed**

Vector Quantization (VQ)

- **MIL-STD-188-199**
- **ISO/IEC 12087-5 BIIF Annex B**
 - **Compress once, use product many times**
 - **Decompress via simple code book look up process**
 - **High compression (.75bpp), yet visually lossless**
 - **Used for raster scanned maps, e.g. CADRG**
 - **Used for Controlled Image Base (CIB)**
 - **Unlimited image size; typical is 1536 x 1536**
 - **Suitable for 286 or higher processor**

JPEG 2000

- **ISO/IEC 15444 Part 1**
 - **Wavelet based decomposition by resolution**
 - **Arithmetic entropy encoding**
 - **Pixel precision from 1 to 38 bits per pixel**
 - **Single and multiple bands**
 - **Both numerically lossless and lossy options**
 - **Very scalable**
 - **Many processing options can be done in the compressed data domain (w/o decompression)**
 - **Suitable for today's PC's, Hand-helds, scanners, digital cameras, etc.**

Contact Information

NITFS Test Facility

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<http://jitc.fhu.disa.mil/nitf/nitf.htm>